

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (previously presented): A fuel cell according to claim 32, wherein the anode is formed by the process comprising:

- forming a plastic mass comprising a mixture of an electrolyte substance and an electrochemically active substance;
- extruding the plastic mass through a die to form an extruded tube; and
- sintering the extruded tube to form a tubular anode capable of supporting the solid oxide fuel cell.

Claim 2 (previously presented): A fuel cell according to claim 1, wherein the electrolyte is formed by the process comprising, after sintering the extruded tube, layering an electrolyte onto the tubular anode.

Claim 3 (previously presented): A fuel cell according to claim 2, wherein the cathode is formed by the process comprising, after layering the electrolyte, layering a cathode onto the electrolyte.

Claim 4 (previously presented): A fuel cell according to claim 1, wherein the process for forming the anode further comprises:

- reducing an oxide of an electrochemically active substance in the anode, to form pores.

Claim 5 (previously presented): A fuel cell according to claim 4, wherein reducing the oxide of the electrochemically active substance comprises flowing a reducing gas over a surface of the anode.

Claim 6 (previously presented): A fuel cell according to claim 5, wherein reducing the oxide of the electrochemically active substance comprises flowing hydrogen gas over the surface of the anode at a temperature between 800°C and 1000°C.

Claim 7 (previously presented): A fuel cell according to claim 4, wherein the process for forming the anode further comprises:
milling a catalyst with the electrochemically active substance.

Claim 8 (previously presented): A fuel cell according to claim 7, wherein the catalyst comprises a material chosen from the group consisting of: CeO₂, ruthenium, rhodium, rhenium, palladium, scandia, titania, vanadia, chromium, manganese, iron, cobalt, nickel, zinc, and copper.

Claim 9 (previously presented): A fuel cell according to claim 8, wherein the catalyst comprises CeO₂ in a proportion of between 1% and 3% by weight.

Claim 10 (previously presented): A fuel cell according to claim 1, wherein forming a plastic mass comprises forming a mass comprising a mixture of stabilized zirconia and nickel oxide.

Claim 11 (previously presented): A fuel cell according to claim 2, wherein layering the electrolyte comprises spraying a stabilized zirconia electrolyte onto the tubular anode.

Claim 12 (previously presented): A fuel cell according to claim 2, wherein layering the electrolyte comprises dip-coating a stabilized zirconia electrolyte onto the tubular anode.

Claim 13 (previously presented): A fuel cell according to claim 3, wherein layering the cathode comprises spraying a strontia-doped lanthanum manganite cathode onto the electrolyte.

Claims 14-15 (Canceled).

Claim 16 (previously presented): A fuel cell according to claim 2, wherein the tubular anode comprises a substantially uniform ratio of electrochemically active substance to electrolyte substance.

Claim 17 (Canceled).

Claim 18 (previously presented): A fuel cell according to claim 43, wherein the anode is formed by co-extruding more than one anode layer to form the tubular anode.

Claims 19-26 (Canceled).

Claim 27 (previously presented): A fuel cell according to claim 52, wherein the active layer is extruded around a current-collecting wire.

Claim 28 (Canceled).

Claim 29 (previously presented): A fuel cell according to claim 1, wherein the extruded tube has a non-circular cross-section.

Claim 30 (previously presented): A fuel cell according to claim 32, wherein the anode is formed by the process comprising:

forming first and second plastic masses, each plastic mass comprising a mixture of an electrolyte substance and an electrochemically active substance, the first plastic mass having a higher relative content ratio of electrochemically active substance to electrolyte substance, and the second plastic mass having a lower relative content ratio of electrochemically active substance to electrolyte substance;

extruding the first plastic mass through a die to form a first extruded tube;

extruding the second plastic mass through a die to form a second extruded tube;

fitting the first extruded tube inside the second extruded tube to form a combined tube; and

sintering the combined tube to form a tubular anode capable of supporting the solid oxide fuel cell.

Claim 31 (previously presented): A fuel cell according to claim 30, wherein each plastic mass comprises a mixture of stabilized zirconia and nickel oxide, the first plastic mass having a higher relative content ratio of nickel oxide to stabilized zirconia, and the second plastic mass having a lower relative content ratio of nickel oxide to stabilized zirconia.

Claim 32 (currently amended): A tubular solid oxide fuel cell comprising:

a tubular anode having pores formed by reduction of an oxide of an electrochemically active substance without inclusion of a distinct pore forming substance;

an electrolyte disposed on a surface of the tubular anode; and

a cathode disposed on the electrolyte, wherein ~~the anode provides the structural integrity of the solid oxide fuel cell, and the electrolyte and cathode are of insufficient strength to support the solid oxide fuel cell~~ a thickness of the anode comprises over 50% of a total thickness of the anode, the electrolyte, and the cathode.

Claim 33 (previously presented): A fuel cell according to claim 32, wherein the anode comprises a mixture of stabilized zirconia and nickel oxide.

Claim 34 (Original): A fuel cell according to claim 33, wherein the electrolyte comprises stabilized zirconia.

Claim 35 (Original): A fuel cell according to claim 32, wherein the cathode comprises a strontia-doped lanthanum manganite.

Claim 36 (previously presented): A fuel cell according to claim 32, wherein the cathode comprises at least one of:

gadolinium manganate; and
a cobaltate.

Claim 37 (previously presented): A fuel cell according to claim 32, wherein the cathode comprises more than one cathode layer, each cathode layer having a different composition.

Claim 38 (canceled).

Claim 39 (Original): A fuel cell according to claim 32, wherein the anode has a thickness in the range of 300 μ m to 400 μ m.

Claim 40 (Original): A fuel cell according to claim 32, wherein the anode comprises a catalyst material chosen from the group consisting of: CeO₂, ruthenium, rhodium, rhenium, palladium, scandia, titania, vanadia, chromium, manganese, iron, cobalt, nickel, zinc, and copper.

Claim 41 (Original): A fuel cell according to claim 40, wherein the catalyst comprises CeO₂ in a proportion of between 1% and 3% by weight.

Claim 42 (Original): A fuel cell according to claim 32, wherein the anode comprises a volume percentage of nickel of between 40% and 50%.

Claim 43 (Original): A fuel cell according to claim 32, wherein the anode comprises more than one anode layer, each layer having a different composition.

Claim 44 (Original): A fuel cell according to claim 43, wherein each of the anode layers comprises a ratio of electrochemically active substance to electrolyte substance, and wherein such ratios are higher for layers that are layered further from a surface of the anode that contacts a fuel gas than for layers that are layered closer to the fuel gas.

Claim 45 (Original): A fuel cell according to claim 44, wherein the electrochemically active substance is nickel and the electrolyte substance is stabilized zirconia.

Claim 46 (Original): A fuel cell according to claim 44, wherein there are two anode layers.

Claim 47 (Original): A fuel cell according to claim 44, wherein there are more than two anode layers.

Claim 48 (Original): A fuel cell according to claim 43, wherein the more than one anode layers comprise a thicker support layer and a thinner active layer, the support layer being in contact with a fuel gas.

Claim 49 (Original): A fuel cell according to claim 48, wherein the support layer comprises a higher ratio of stabilized zirconia to nickel, and wherein the active layer comprises a lower such ratio.

Claim 50 (Original): A fuel cell according to claim 48, wherein the support layer comprises from 0% to 50% nickel by volume.

Claim 51 (Original): A fuel cell according to claim 48, wherein the active layer comprises from 40% to 45% nickel by volume.

Claim 52 (Original): A fuel cell according to claim 48, wherein the active layer comprises an embedded current-collecting wire.

Claim 53 (Original): A fuel cell according to claim 48, wherein the support layer comprises aluminum oxide.

Claim 54 (Original): A fuel cell according to claim 32, wherein the tubular anode has a non-circular cross-section.

Claims 55-86 (canceled).

Claim 87 (previously presented): A fuel cell according to claim 1, wherein sintering comprises:

drying the extruded tube;

sintering the extruded tube in air in a furnace having a furnace temperature ramp rate of approximately 0.5EC per minute, up to approximately 500EC, followed by a ramp rate of approximately 3EC per minute up to approximately 1300EC, and a dwell time of approximately 2 hours for sintering.

Claim 88 (previously presented): A fuel cell according to claim 37, wherein there are two cathode layers.

Claim 89 (previously presented): A fuel cell according to claim 37, wherein there are more than two cathode layers.

Claim 90 (previously presented): A fuel cell according to claim 88, wherein the two cathode layers comprise:

an inner cathode layer comprising a mixture, 50/50 wt % of $\text{La}_{0.80}\text{Sr}_{0.20}\text{MnO}_3$ (Rhodia, 99.9% pure) with 8mol% YSZ (Tosoh); and

an outer cathode layer comprising substantially only $\text{La}_{0.80}\text{Sr}_{0.20}\text{MnO}_3$ (Rhodia, 99.9% pure).

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Claim 91 (previously presented): A fuel cell according to claim 37, wherein the cathode is formed by the process of spraying the cathode layers onto the electrolyte.